

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT (PCT Article 36 and Rule 70)



Applicant's or agent's file reference 0000053993	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/EP 03/11371	International filing date (<i>day/month/year</i>) 14.10.2003	Priority date (<i>day/month/year</i>) 21.10.2002
International Patent Classification (IPC) or both national classification and IPC B29B7/42		
Applicant BASF AKTIENGESELLSCHAFT		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

 These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:
 - I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

Date of submission of the demand 14.05.2004	Date of completion of this report 21.01.2005
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Fageot, P Telephone No. +31 70 340-2092 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP 03/11371

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-12 as originally filed

Claims, Numbers

1-7 received on 06.10.2004 with letter of 05.10.2004

Drawings, Sheets

1/6-6/6 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY
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International application No. **PCT/EP 03/11371**

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-7
	No: Claims	
Inventive step (IS)	Yes: Claims	1-7
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-7
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents:

D1: US-A-4 447 156

D2: DE 27 22 933 A

2. In respect of Article 6 PCT, the following is observed.

- 2.1 The terms "arranged offset in relation to each other" used in claim 1 are vague and unclear and leave the reader in doubt as to the meaning of the technical features to which they refer, thereby rendering the definition of the subject-matter of said claims unclear.

A possible basis for amendments can be found in the description on page 7, lines 35-41 and on page 10, lines 3-6.

- 2.2 Claim 7 comprises all the features of claim 1 and is therefore formally dependent on claim 1, cf. Rule 6.4 PCT.

- 2.3 The description has not been brought in conformance with claims 1 - 7.

3. The following statements are made under reference to paragraph V.2 of this international preliminary examination report.

- 3.1 Independent claim 1

The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and shows (the references in parentheses applying to this document): a mixing device comprising a shaft (*col. 3, lines 64-66, fig. 1, 4*), a front ring (*col. 3, lines 54, 55, fig. 1, 4*), and an end ring connected to the shaft at a distance A from each other (*col. 3, lines 51, 52, fig. 1, 4*), and a loose mixing ring (*col. 3, lines 56-58, fig. 1, 4*) which is freely rotatable and can be moved back and forth between the front ring and the end ring, wherein the front ring and the end ring in each case have at least one channel *respectively* (*col. 4, lines 40-50, fig. 4*), which runs axially parallel, at an angle in relation to the axis of the shaft or helically (*figure 4*), and has in each case at least two regions of different outside diameters,

of which the region with the smaller outside diameter is respectively located on the side facing the mixing ring (*col. 4, lines 40-50, fig. 1, 4*), and the mixing ring has a first region in which its inside diameter is large enough for it to be able to overlap with the region of smaller diameter of the front ring, has an adjoining second region, and also an adjoining third region, in which its inside diameter is large enough for it to be able to overlap with the region of smaller diameter of the end ring and the mixing ring is so long that, in its respective end positions, the other of the two rings is partially overlapped (*col. 4, lines 25-29, fig. 4, 6, 9*).

The subject-matter of claim 1 differs from this known D1 in that: the mixing ring has on its inner side of the second region at least two channels offset in relation to each other.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

The problem underlying claim 1 may be regarded as providing a mixing device with improved mixing efficiency and reduced malfunctioning and wear, and which can be easily fitted and removed in different screw machines without complex adaptation (description, page 2, line 42, - page 3, line 3).

The solution to this problem proposed in claim 1 of the present application is neither known nor is it suggested from the cited prior art documents. Consequently the subject-matter of claim 1 meets the requirement of Article 33(3) PCT.

3.2 Independent claim 5

The same reasoning applies, *mutatis mutandis*, to the subject-matter of the corresponding independent claim 5, which therefore is also considered new and inventive.

4. Dependent claims 2 - 4, 6 and 7

Claims 2 - 4, 6 and 7 are dependent on claims 1 and 5 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

5. The subject-matter of claims 1 to 7 is considered as susceptible of industrial application (Article 33(4) PCT).

6. The following is to be noted too.

6.1 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1 and D2 is not mentioned in the description, nor are these documents identified therein.

6.2 Although claim 1 is drafted in the two-part form the features:

"the mixing ring is a loose mixing ring, which is freely rotatable and can be moved back and forth between the front ring and the end ring, and that the mixing ring has a first region in which its inside diameter is large enough for it to be able to overlap with the region of smaller diameter of the front ring, and also an adjoining third region, in which its inside diameter is large enough for it to be able to overlap with the region of smaller diameter of the end ring and the mixing ring is so long that, in its respective end positions, the other of the two rings is partially overlapped",

are incorrectly placed in the preamble portion, as they are not disclosed in document D1 (Rule 6.3(b) PCT).

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13

We claim:-

1. A mixing device comprising a shaft (1), a front ring (2) and
5 an end ring (3) connected to the shaft at a distance A from
each other, and a loose mixing ring (4), which is freely
rotatable and can be moved back and forth between the front
ring and the end ring, wherein
- 10 the front ring and the end ring in each case have at least
one channel (2k) or (3k), respectively, which runs axially
parallel, at an angle in relation to the axis of the shaft or
helically, and has in each case at least two regions of
15 different outside diameters, of which the region with the
smaller outside diameter is respectively located on the side
facing the mixing ring, and
- 20 the mixing ring has a first region in which its inside
diameter is large enough for it to be able to overlap with
the region of smaller diameter of the front ring, has an
adjoining second region, and also an adjoining third region,
in which its inside diameter is large enough for it to be
25 able to overlap with the region of smaller diameter of the
end ring and the mixing ring is so long that, in its
respective end positions, the other of the two rings (2) or
(3) respectively is partially overlapped,
- characterized in that
- 30 the mixing ring has on its inner side of the second region at
least two channels (4k) which run axially parallel and are
arranged offset in relation to each other.
2. The device as claimed in claim 1, wherein the shaft has a
35 smooth surface on the section between the front ring and the
end ring.
3. The device as claimed in at least one of claims 1 to 2,
wherein the shaft has at least one circumferential channel
40 (1k) on the section between the front ring and the end ring.
4. The device as claimed in at least one of claims 1 to 3,
wherein the device can be connected on both sides to an
45 adjacent device.

14

5. The use of the device as claimed in at least one of claims 1 to 4 as a mixing element in a screw machine.
6. The use of the device as claimed in claim 5 in connection with a screw tip (5).
7. A screw machine, comprising at least one device as claimed in at least one of claims 1 to 4.

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